
Renewables Portfolio Standards: An Introduction to State Experience, and Possible Cost Impacts

Ryan H. Wiser

Lawrence Berkeley National Laboratory

RHWiser@lbl.gov (510.486.5474)

Utah Climate Policy Symposium

May 8, 2007

Presentation Overview

Part 1:

1. Overview of State RPS
2. RPS Impact on Project Development
3. RPS Design and Design Pitfalls

Part 2:

1. Review of State RPS Cost Studies
2. Actual State RPS Cost Impacts
3. Policy Options for Cost Containment

What Is a Renewables Portfolio Standard?

Renewables Portfolio Standard (RPS):

- A requirement on retail electric suppliers...
- to supply a minimum percentage or amount of their retail load...
- with eligible sources of renewable energy.

Typically backed with penalties of some form

Often accompanied by a tradable renewable energy credit (REC) program, to facilitate compliance

Never designed the same in any two states

Advantages and Disadvantages of a Renewables Portfolio Standard

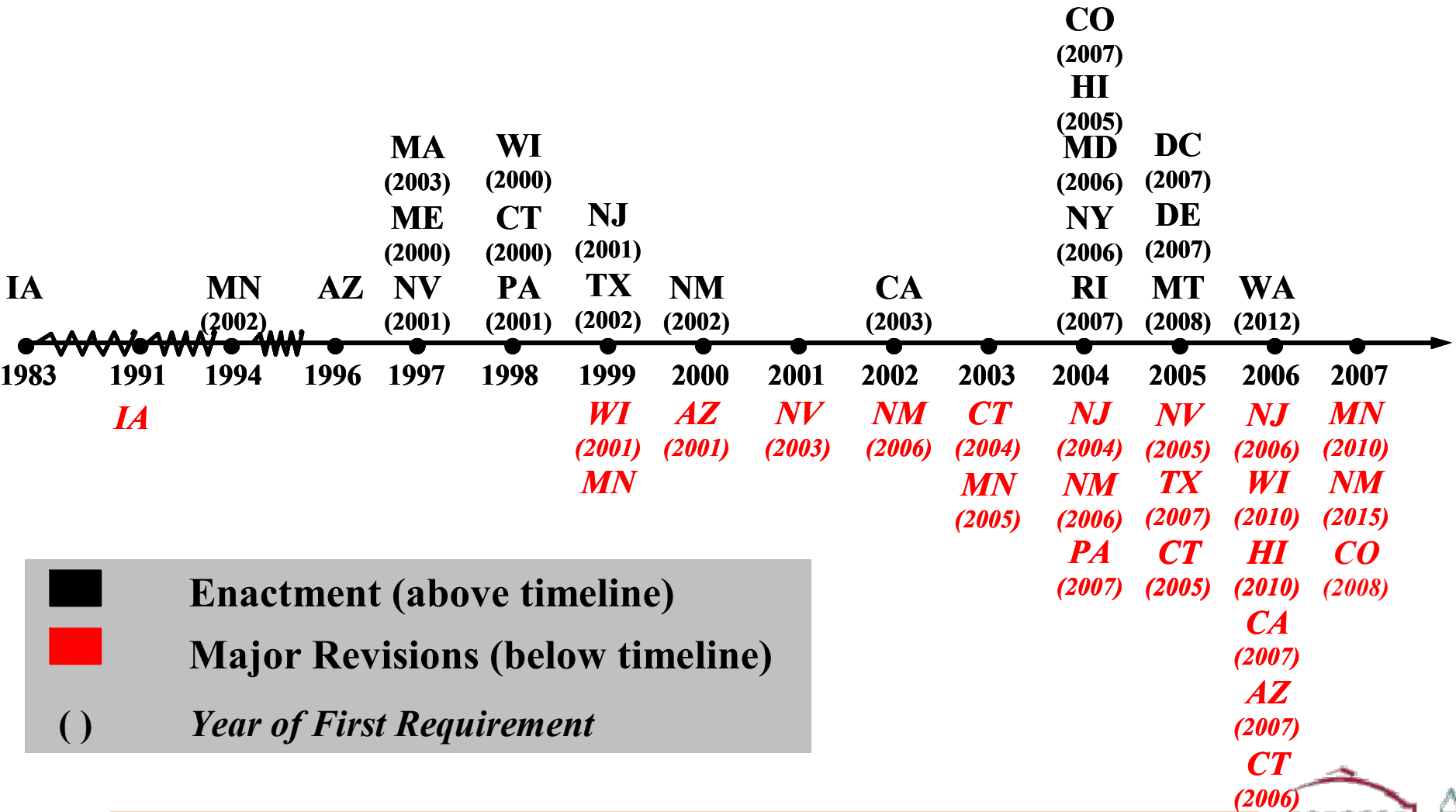
ADVANTAGES

- Can ensure known quantity of renewable energy
- Can lower cost of achieving target by giving private market flexibility
- Competitively neutral if applied to all load-serving entities
- Relatively low administrative costs and burdens
- Can be applied in restructured and regulated markets

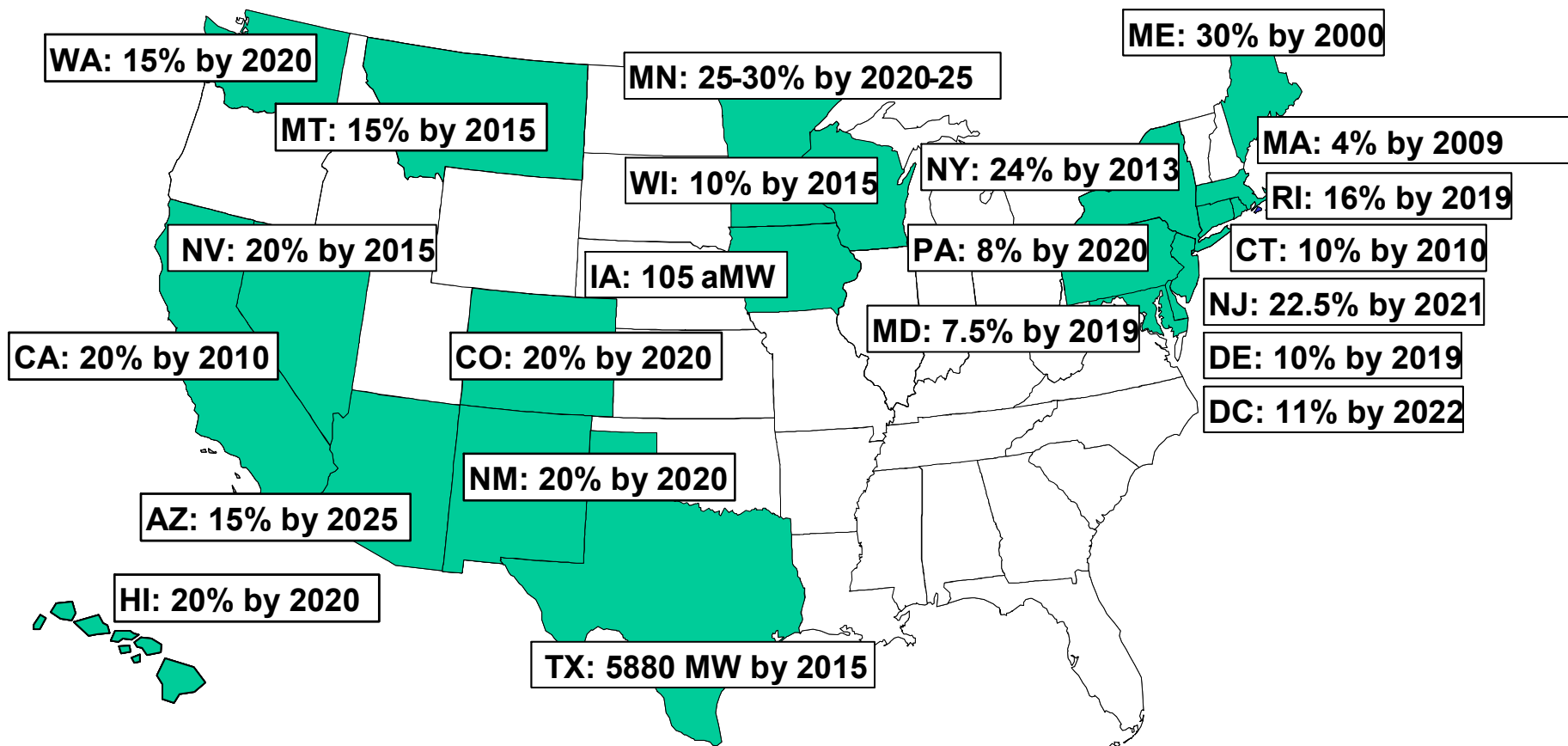
DISADVANTAGES

- Due to complexity, can be difficult to design well
- Less flexible in offering targeted support to *specific* RE sources, or ensuring resource diversity
- Cost impacts not known with precision in advance
- Questions over whether RPS policies will necessarily lead to long-term contracts
- Operating experience is limited

State RPS Activity is Significant in Recent Years



State RPS Policies: 21 States and D.C.



- Additional renewable energy “goals” established in IL, IA, VT, WV, and ME
- New Hampshire and Oregon on verge of creating RPS policies

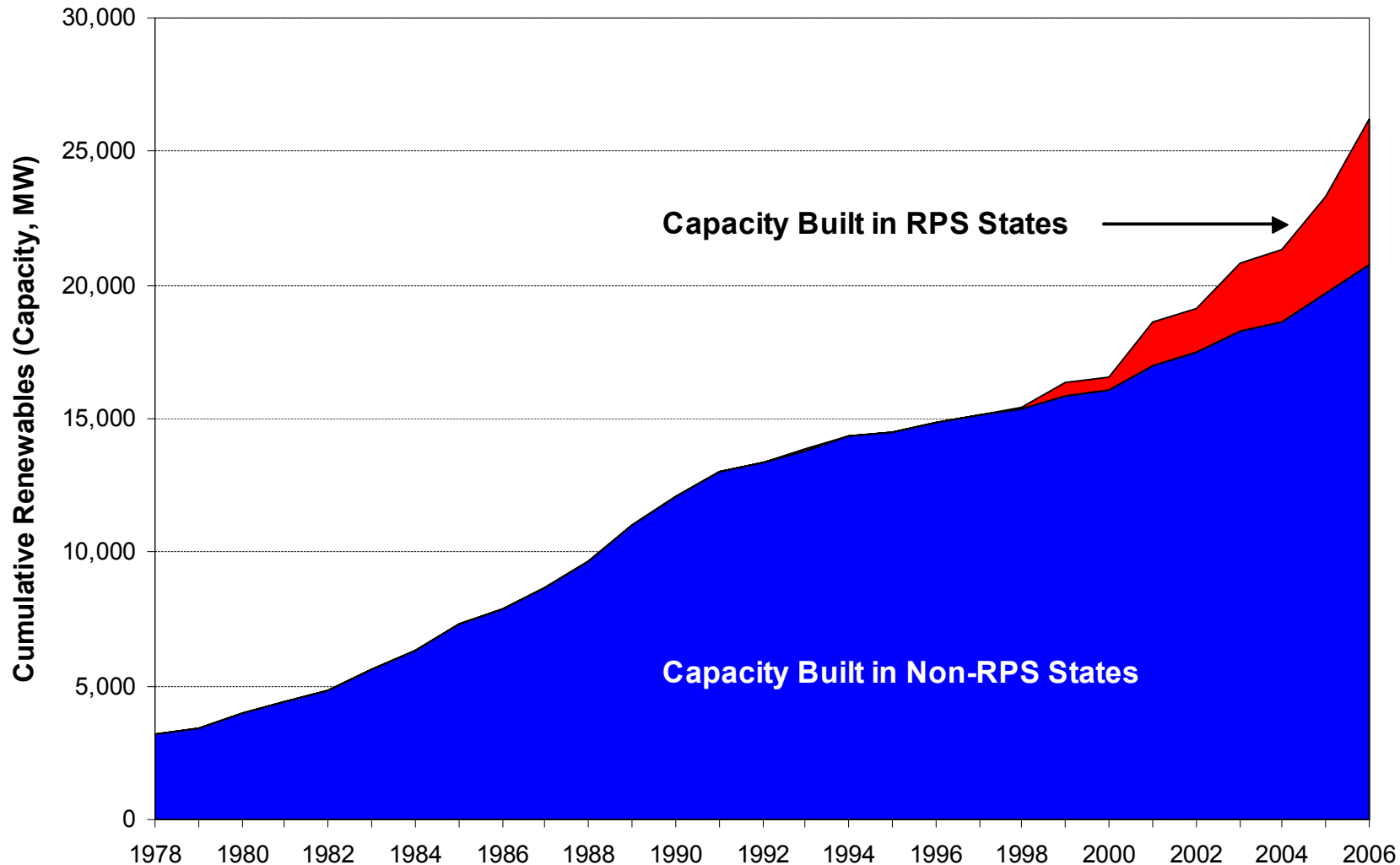
State RPS Program Context

- **Load Covered:** Roughly 40% of U.S. load covered by a state RPS
- **RPS Development:** Most policies emanated from state legislation, but some from regulatory action (e.g., NY, AZ) and two from state ballot initiatives (CO, WA)
- **RPS Application:** RPS typically applies to regulated IOUs and competitive energy service providers; publicly owned utilities sometimes exempt
- **Regulated vs. Restructured:** Initially concentrated in restructured states, but now roughly half in monopoly markets
- **Operating Experience:** Experience with policy is growing, but few states have >5 years experience

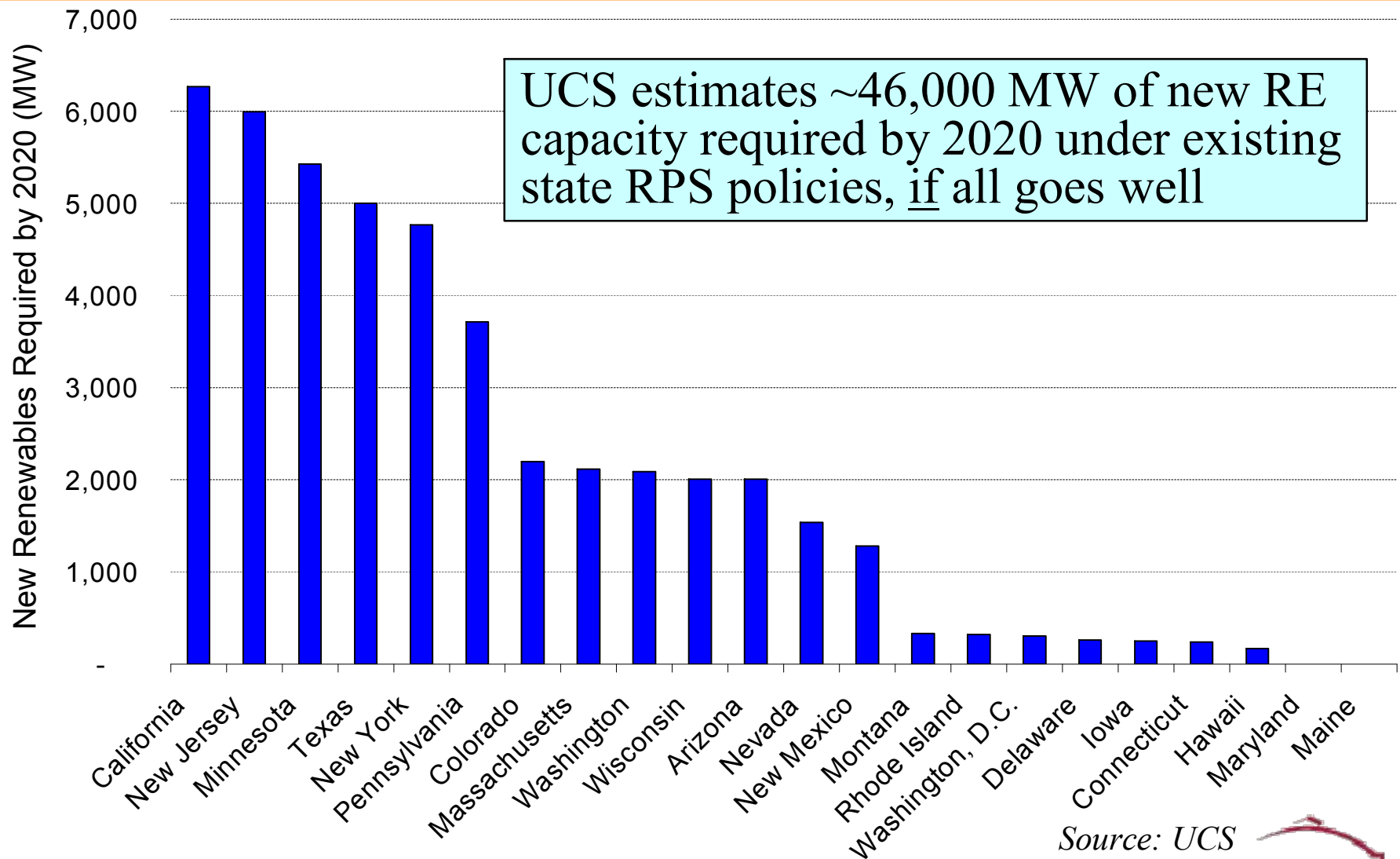
Presentation Overview – Part 1

1. Overview of State RPS
- 2. RPS Impact on Project Development**
3. RPS Design and Design Pitfalls
4. Conclusions

State RPS Policies Are a Significant Driver for Renewable Energy Growth



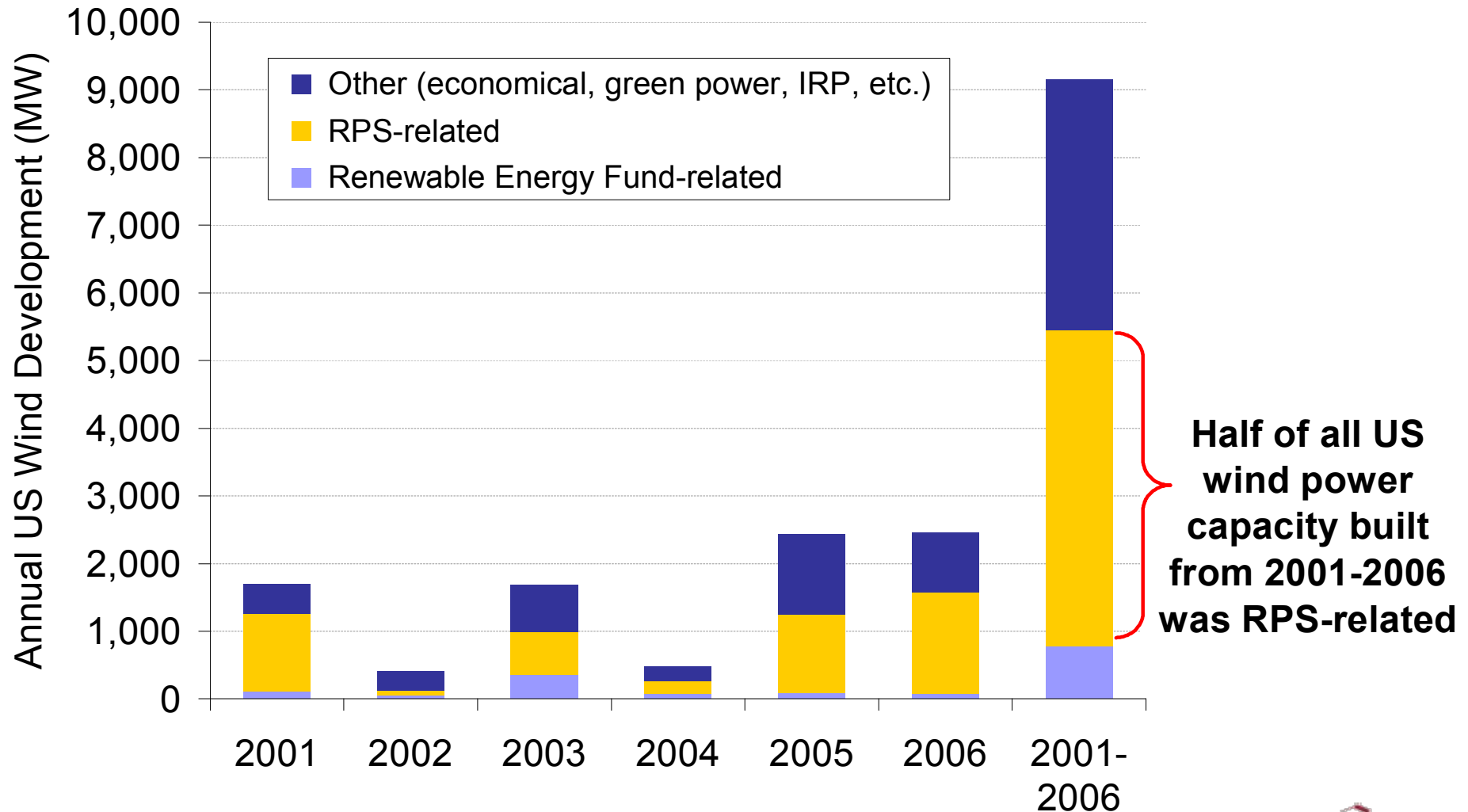
Looking Ahead, Existing State RPS' Could be a Major Driver of New Renewables Capacity



Source: UCS



Wind Power is Faring Well Under State RPS Policies...



...But Other Technologies Will Also Benefit

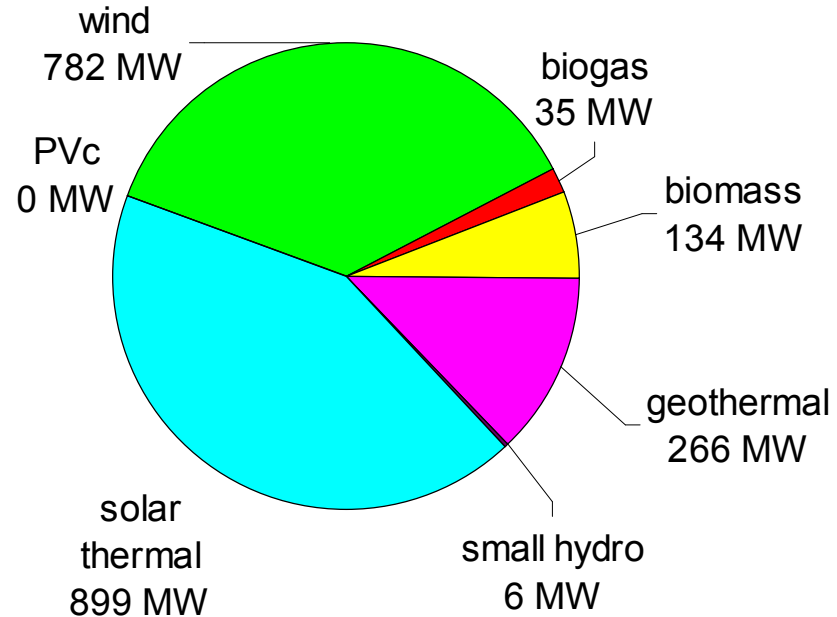
Most RPS requirements have been met with wind so far, but increasing competition in some states from geothermal, biomass, and solar thermal

California's RPS procurements are governed by "Least Cost, Best Fit" criteria

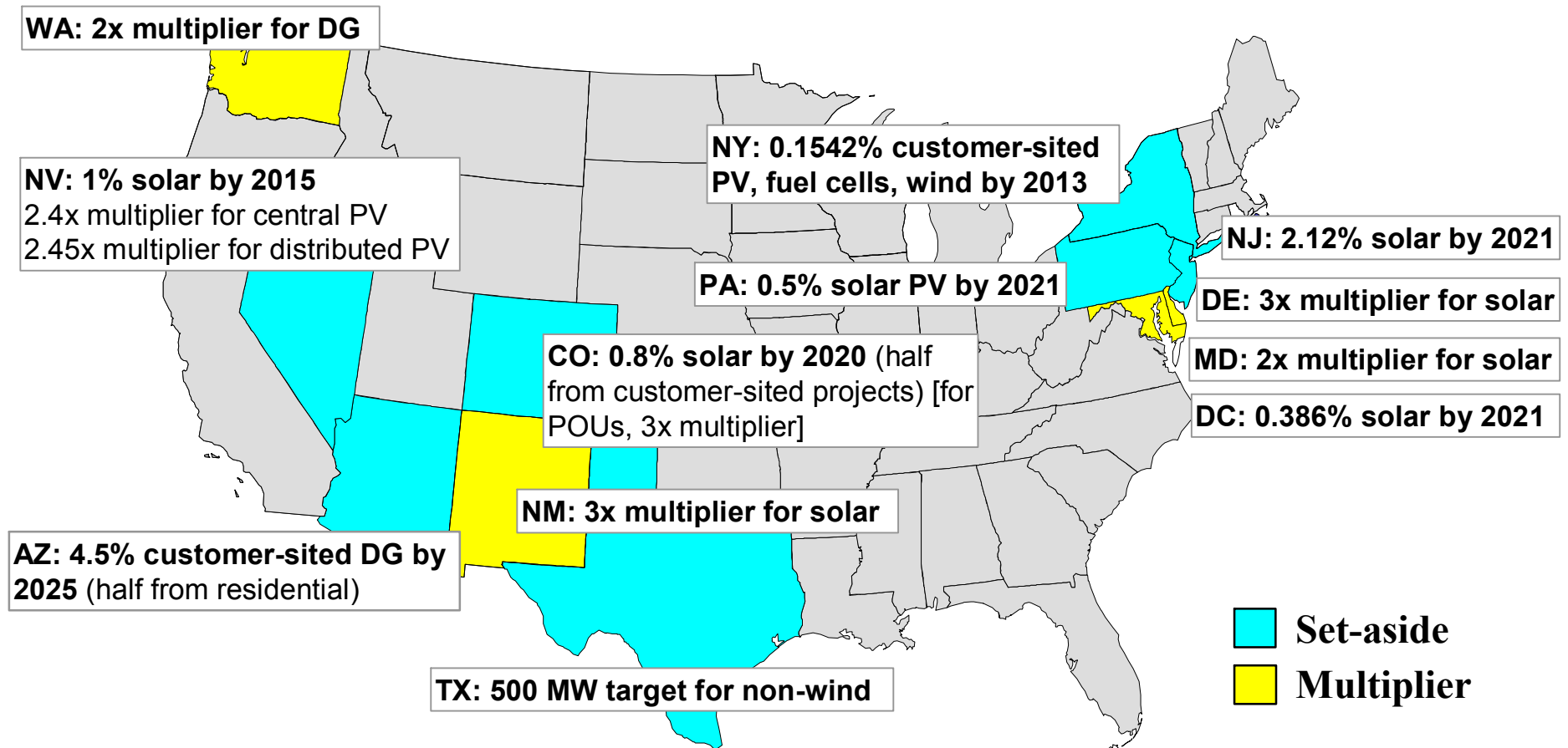
...and...

Wind may not always provide the "Best Fit" (even if "Least Cost")

New, Repowered, or Re-Started Capacity, by Technology (minimum MW, IOUs only)

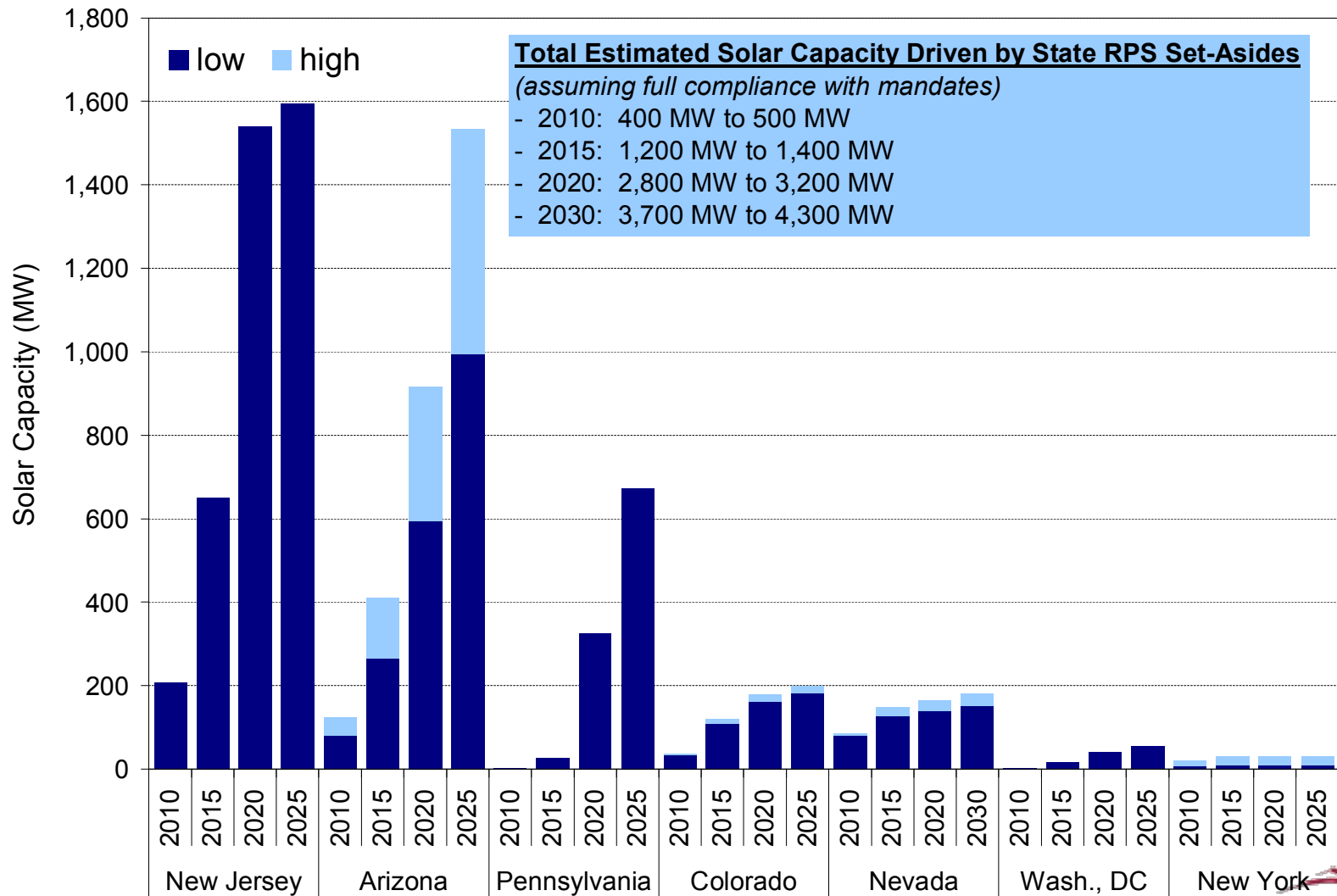


Many RPS Policies Provide Differential Support for Solar/Distributed Generation



Update: Maryland now has a solar set-aside as well

State RPS Set Asides will Be a Major Source of Future Demand for Solar



Presentation Overview – Part 1

1. Overview of State RPS
2. RPS Impact on Project Development
- 3. RPS Design and Design Pitfalls**
4. Conclusions



The Most Important (and obvious) Lesson Learned to Date

An RPS Can Be A...

**Elegant, cost
effective, flexible
policy to meet RE
targets**

?

**Poorly designed,
ineffective, or costly
way to meet RE
targets**

**The legislative and regulatory
design details matter!!!**



RPS Design Varies Substantially From One State to the Next

Structure, Size and Application

Basis (energy vs. capacity obligation)

Structure (e.g., single tier or multiple tiers)

Percentage purchase obligation targets

Start date

Duration of purchase obligation

Resource diversity requirements or incentives

Application to LSEs - Who must meet targets?

Product- or company-based application

Eligibility

Geographic eligibility

Resource type eligibility

Eligibility of existing renewable generation

Definition of new/incremental generation

Treatment of multi-fuel facilities

Treatment of off-grid and customer-sited facilities

Administration

Regulatory oversight body(ies)

Compliance verification (TRCs or contract-path)

Certification of eligible generators

Compliance filing requirements

Enforcement mechanisms

Cost caps

Flexibility mechanisms (banking, borrowing, etc.)

Implementing future changes to the RPS

Contracting standards for regulated LSEs

Cost recovery for regulated LSEs



Variations in Design Are Driven By Different Goals, Market Circumstances, Political Influences

- Result is uneven historical and expected market impacts of state RPS policies
- Some RPS policies seemingly working well...
 - Texas, Minnesota, New Mexico, others
- Other policies are under-performing so far...
 - Under-compliance in Arizona, Nevada, Massachusetts, and California so far
 - Other policies have largely supported or will support existing (not new) renewable generation (ME, MD, etc.)
- Many others are just getting underway, but there are reasons to be concerned



Design Pitfalls

Lenient Geographic Boundaries/Eligibility Restrictions

- Can enlarge the market for RECs, but may also moderate need for new renewable energy capacity and reduce local benefits

Force Majeure Clauses and Cost Caps

- Compliance flexibility should be encouraged, but new RPS policies increasingly including a lot of “wiggle room” to possibly allow escape from full compliance

Funding Caps

- Where funding caps are in place, they may be insufficient to allow the RPS to be achieved

Application to Publicly Owned Electric Utilities

- Publicly owned utilities often exempt or provided more lenient requirements



Design Pitfalls (cont.)

Inadequate Enforcement

- Where full compliance is apparently not being achieved...will penalties be used to enforce compliance?

Policy Instability

- Uncertainty in RPS duration, target, or eligible technologies can impede development

Transmission Bottlenecks

- Some states trying to be more proactive with transmission planning/construction, but transmission remains a key barrier in many states

Design Complexity

- Is the complexity inherent in the California RPS worth it?



What Makes a Strong State RPS?

Policy Design Requirements

- Broad applicability (*limited exemptions ok*)
- Carefully balanced supply-demand (*ensures new supply, but not overly aggressive*)
- Sufficient duration and stability of targets (*provides market confidence*)
- Well-defined/stable resource eligibility rules (*ambiguity erodes confidence*)
- Well-defined/stable out-of-state resource eligibility (*ambiguity erodes confidence*)
- Credible & effective enforcement (*to ensure compliance*)
- Flexible verification (*simplifies oversight, contracting; may lower compliance costs*)
- Adequate compliance flexibility (*to ensure that targets can be achieved at low cost*)
- Contracting standards/cost recovery for regulated utilities and providers of last resort (*to ensure reasonable compliance effort, and long-term contracts*)
- Product-based (not company-based) compliance (*supports voluntary sales*)



Presentation Overview – Part 1

1. Overview of State RPS
2. RPS Impact on Project Development
3. RPS Design and Design Pitfalls
- 4. Conclusions**



Conclusions

- State RPS policies are a principal form of support for renewable energy, and are becoming increasingly popular
- A state RPS *can* effectively deliver renewable energy and associated benefits at low cost
- Designing an effective RPS requires careful attention – the devil is in the details!!!



Presentation Overview – Part 2

1. Review of State RPS Cost Studies
2. Actual State RPS Cost Impacts
3. Policy Options for Cost Containment
4. Conclusions



Project Overview

Objective: Review previous state RPS cost-benefit *projections* to compare forecasted impacts across studies, and provide methodological guidance for future RPS cost-benefit projections

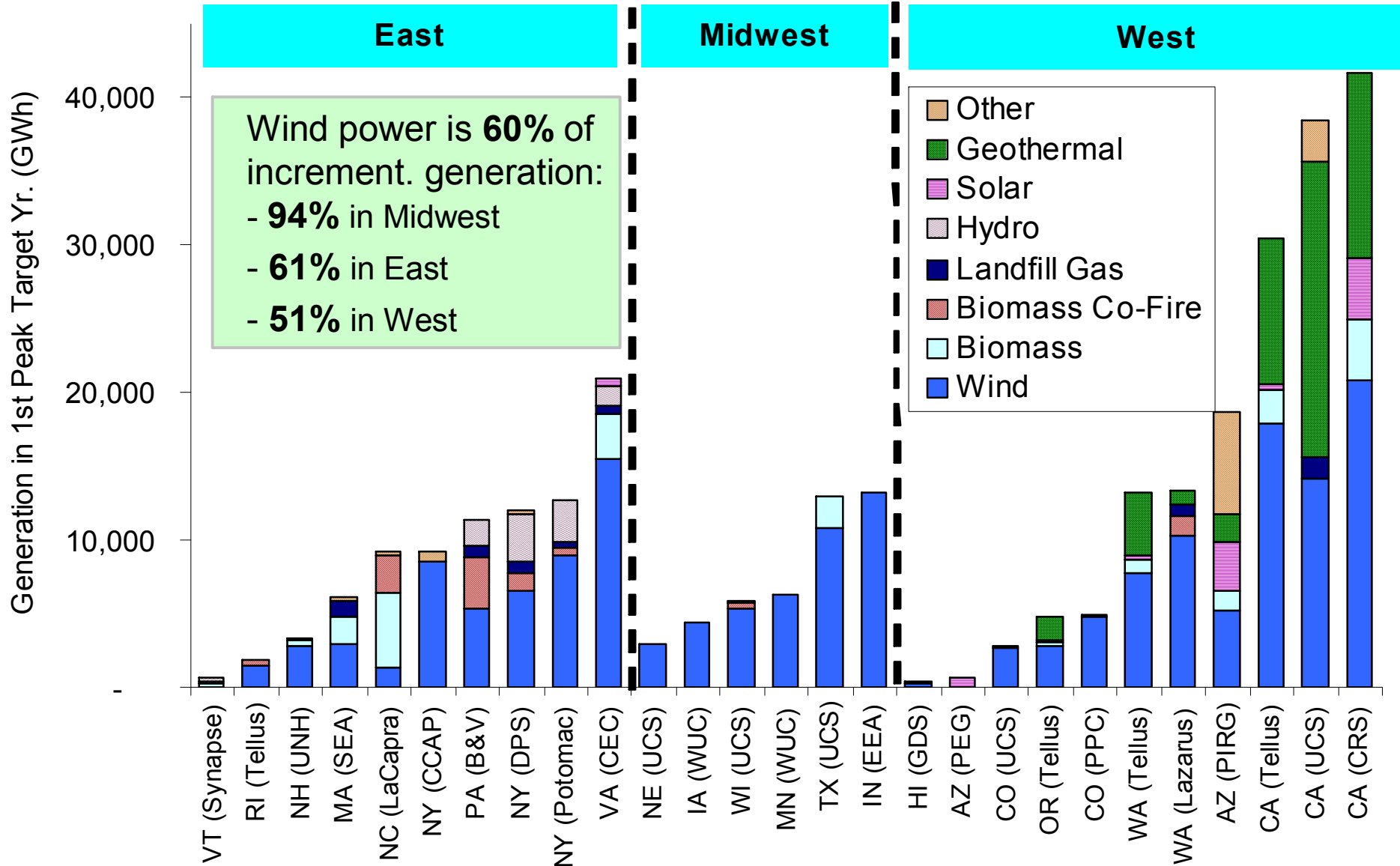
- **Project scope**
 - Survey of 30 state RPS cost impact projections in 20 states
 - Sample includes state and utility-level (not federal) analyses in the U.S.
 - Studies present projected (not actual) costs and benefits
- **Comparison of key results**
 - Direct or inferred projected retail rate impacts
 - Projected renewable deployment by technology
 - Scenario analysis; secondary cost impacts; and benefits
 - All results presented here are taken from the first year that each RPS hits its ultimate target level (e.g. 2013 for New York, 2010 for California)
- **Comparison of study methodologies**
 - Modeling approaches; cost characterizations; and key assumptions



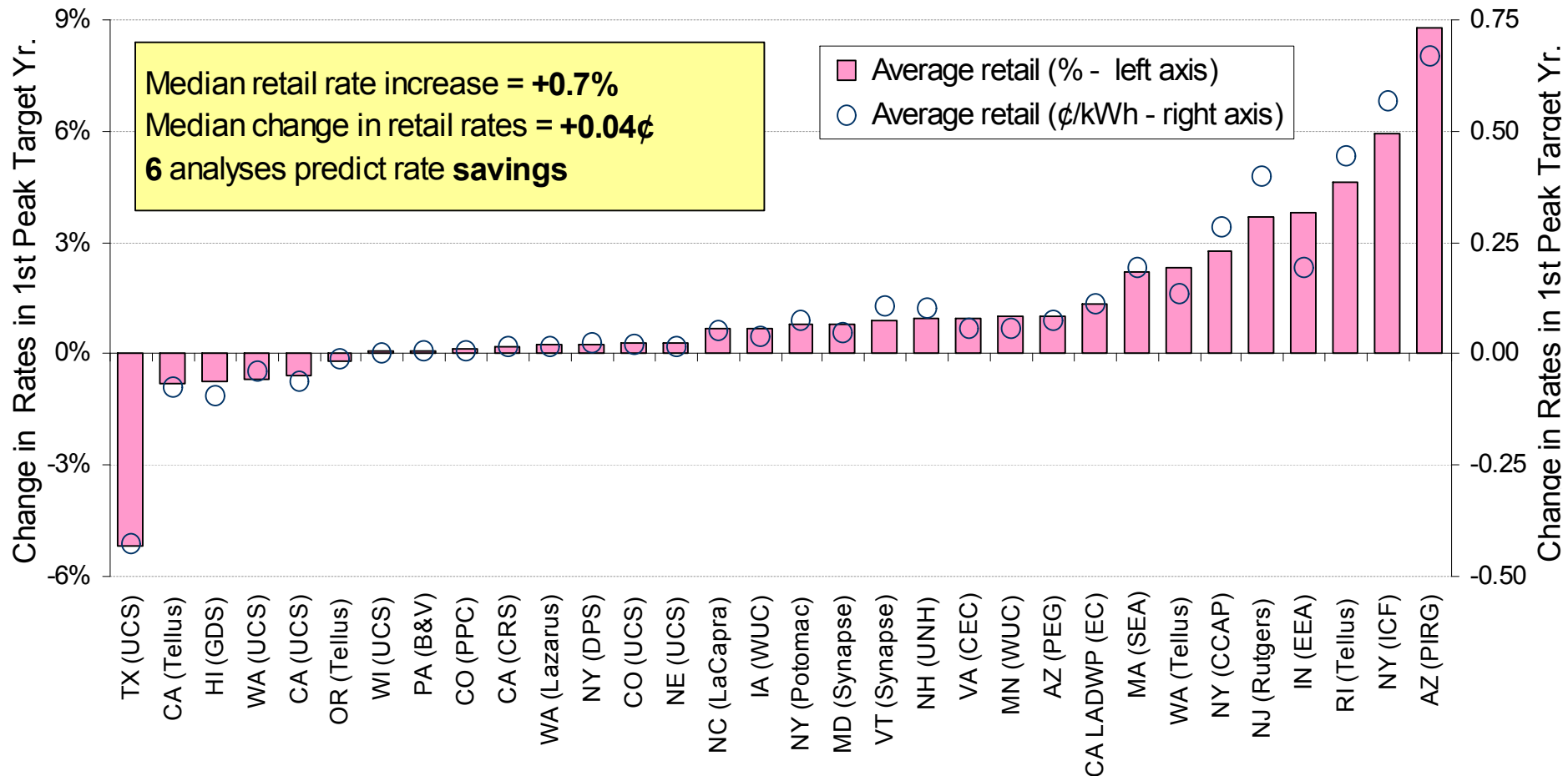
Environmental Energy Technologies Division • Energy Analysis Department



Wind Projected to Fare Well, but Not to Dominate in All Regions



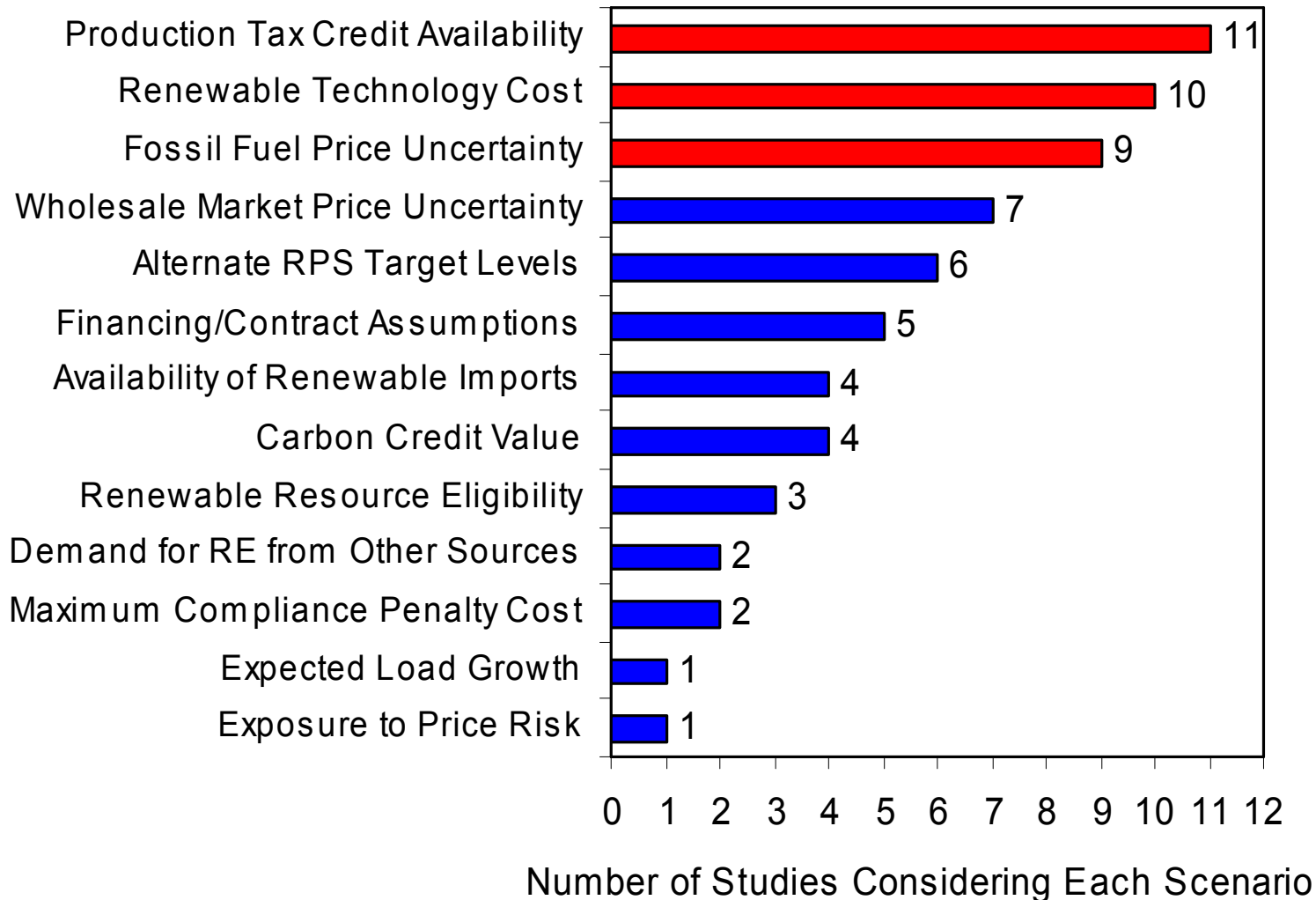
23 of 32* State RPS Analyses Predict Rate Increases of Less Than or Equal to 1%



* Number of analyses is more than 30 because results for each state in CA/OR/WA (Tellus) are shown separately

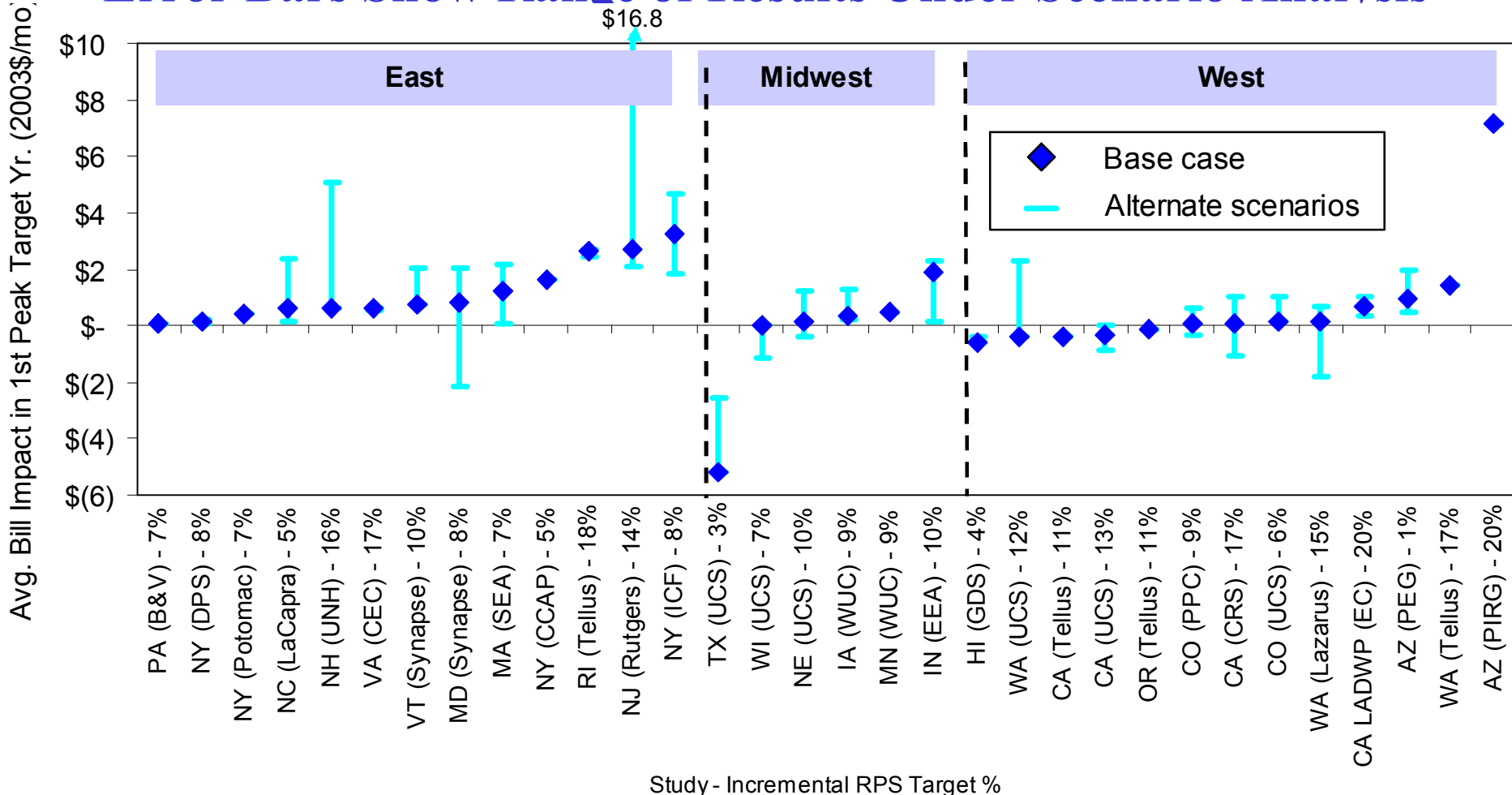


Scenario Analysis Is Often Used to Bound the Possible Impacts

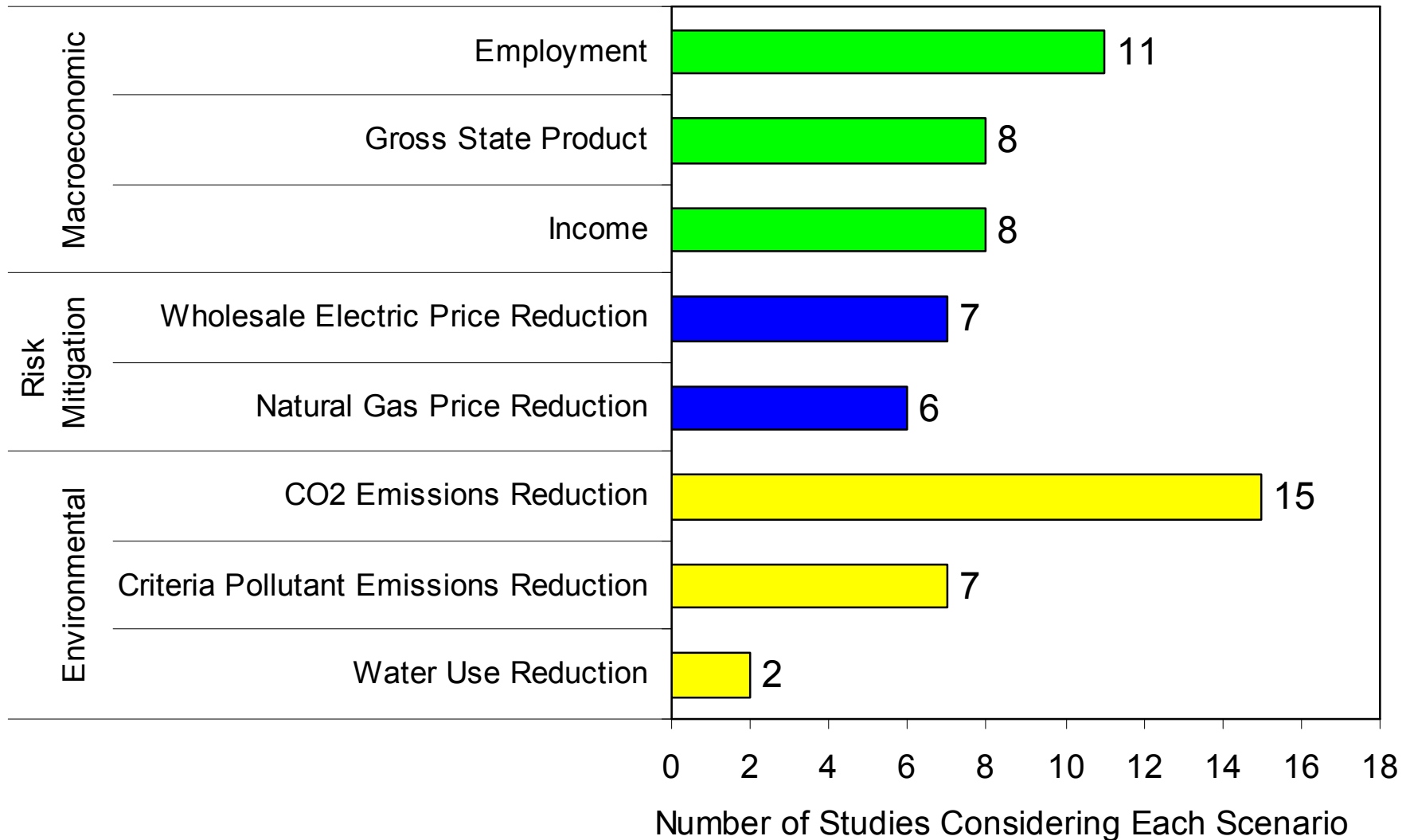


Projected Residential Electricity Bill Impacts are Lowest in Midwest and West

Error Bars Show Range of Results Under Scenario Analysis



Many State RPS Studies Evaluate Potential Public Benefits



Some Possible Areas of Improvement

- **Improved Treatment of Transmission/Integration Costs:** need better estimates of these costs w/high RE penetrations
- **Cost and Potential for Renewable Energy:** more rigorous and current estimates of cost and potential of RE technologies needed
- **Competing RPS Requirements:** consider how potential RPS policies in nearby states would affect RE resource supply and cost
- **Natural Gas Price Forecasts:** benchmark to NYMEX in early years; consider wide range of uncertainty
- **Coal as the Marginal Price Setter:** at high natural gas prices, need to consider possibility that RE will increasingly offset coal
- **Greater Use of Scenario/Risk Analysis:** natural gas and wholesale price uncertainty, PTC availability, wind capital costs
- **Representation of RPS Market Structure:** need to better represent actual contracting practices of obligated entities
- **More Robust Treatment of Public Benefits:** greater efforts to quantify the magnitude of hedge and macroeconomic effects
- **Consideration of Future Carbon Regulation:** consider impacts in the event that future carbon regulations are established



Presentation Overview – Part 2

1. Review of State RPS Cost Studies
- 2. Actual State RPS Cost Impacts**
3. Policy Options for Cost Containment
4. Conclusions



Actual Costs of State RPS Policies

Actual costs and benefits not widely collected and reported, because:
policies operating for a short duration; lack of public data on long-term
contract prices; challenges in estimating secondary costs/benefits

RECs Markets: In RPS markets where RECs or surcharge sets above-market cost, 2006 rate impacts estimated to be at most:

- ME (0.1%)
- MD (0.1%)
- NJ (0.1%)
- NY (0.1%)
- CT (0.2%)
- AZ (0.4%)
- MA (1.1%)

Contract Markets: In many markets where bundled contracts predominate, RPS policies may be providing savings or at worst modest rate increases:

- NM, CO, MN, TX, CA, MT, WI



Presentation Overview – Part 2

1. Review of State RPS Cost Studies
2. Actual State RPS Cost Impacts
- 3. Policy Options for Cost Containment**
4. Conclusions

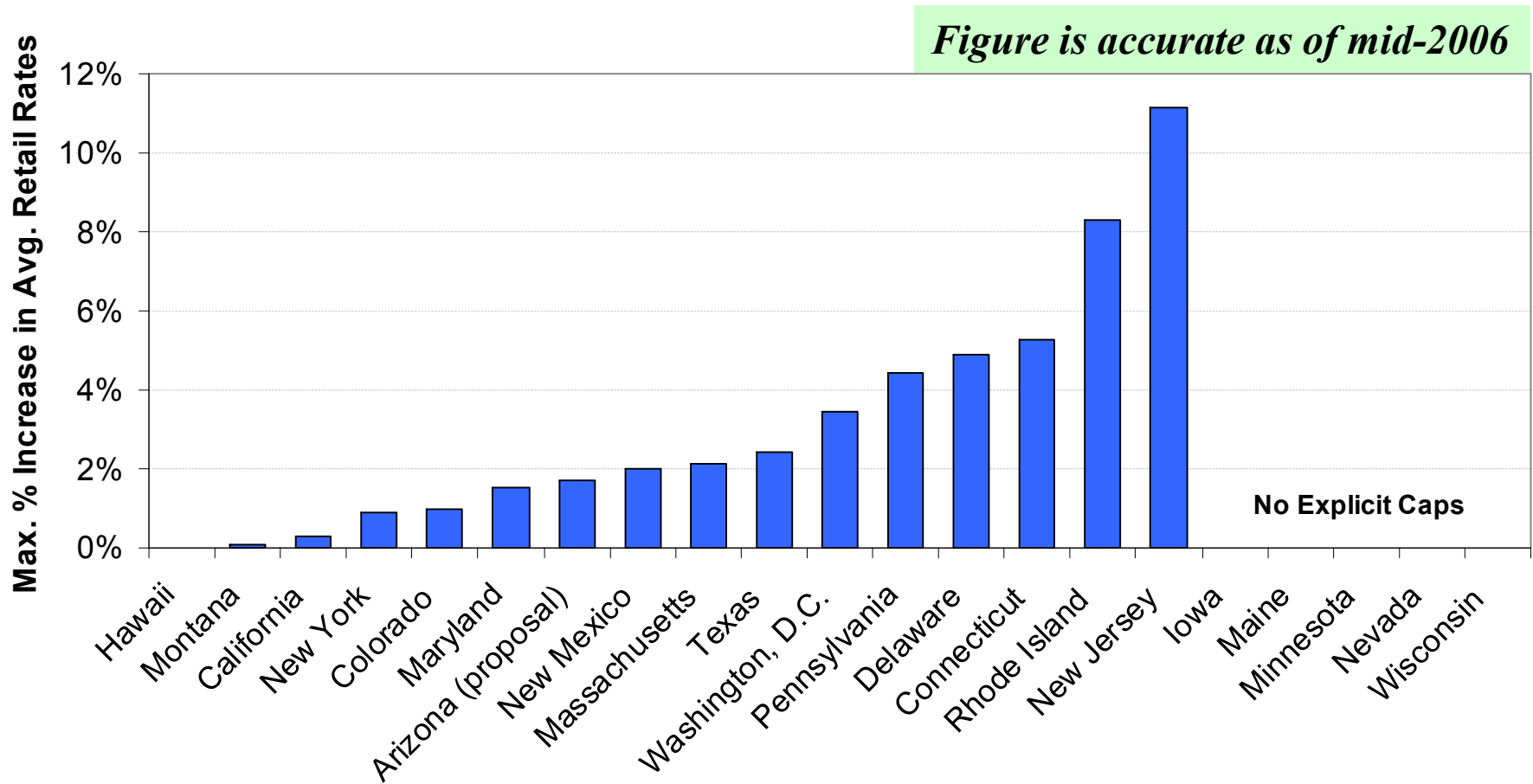


RPS Cost Cap Mechanisms in Use in Other RPS States

- **Retail Rate/Revenue Cost Cap**
 - Colorado, New Mexico, Washington
- **Bundled Contract Price Caps**
 - New Mexico, Hawaii, Montana
- **Alternative Compliance Payments** (*freely available*)
 - Massachusetts, New Jersey, Rhode Island
- **Alternative Compliance Payments** (*available/recoverable in rates if least cost measure and/or insufficient available renewable energy*)
 - Delaware, District of Columbia, Maryland
- **Financial Penalty** (*for competitive suppliers, will act as cost cap*)
 - Connecticut, Texas, Pennsylvania
- **Customer-Class Bill Impact**
 - New Mexico, Maryland, Delaware, Maine
- **Renewable Energy Fund Limitation**
 - Arizona, California, New York
- **Force Majeure Clauses**
 - Pennsylvania, Minnesota, Nevada, Maine, etc.



Maximum Cost Impacts Based on State-Specific Cost Caps



Notes: Assumes that RPS costs will be capped at ACP (or penalty amount in restructured markets). Only includes SBC limits in a some states (e.g., CA), not separately adding any additional incremental transmission/integration costs.



Other RPS Design Elements that Will Affect Compliance Costs

- Percentage targets and timeframes
- Resource eligibility
- Geographic eligibility and delivery requirements
- Set-asides for solar or other resource types
- Flexible compliance mechanisms (RECs, banking, borrowing, settlement periods)
- Encouragement for long-term contracting



Presentation Overview – Part 2

1. Review of State RPS Cost Studies
2. Actual State RPS Cost Impacts
3. Policy Options for Cost Containment
- 4. Conclusions**



Conclusions

- Expected cost of state RPS policies is typically modest; benefits are not insignificant
- A state-specific cost-benefit study can be helpful in educating stakeholders
- Actual RPS costs in most states have, in general, been relatively low
- Cost caps and RPS design can be tailored to avoid some adverse cost impacts
- But... it is true that an RPS *may* increase retail electricity rates

